6. Henricia, Gray. Linckia, *Forbes* not *Nardo*.

The rays 5, rounded, tapering, with rounded tubercles near the ambulacra; the dorsal wart obscure, few rayed, often hidden with small spines.

1. *Henricia oculata*, Gray. Asterias oculata, *Penn.* Asterias sepositia, *Penn.*? Rays 5, closely reticulated with small spines.

Inhab. European Ocean.

[To be continued.]

---

XXIII.—*On the true Method of discovering the Natural System in Zoology and Botany.* By Hugh E. Strickland, M.A., F.G.S., &c.*

It is probable that most naturalists at the present day have an instinctive belief in the existence of a natural system in Zoology and Botany, but there are very few who if questioned on the subject could give any clear explanation of the grounds of their belief, of the nature of that system, or of the mode by which a knowledge of it may be attained. The uncertainty which hangs over the subject is doubtless owing to the obscure and metaphysical nature of some of the principles involved, and still more to the vague conceptions and crude theories which have been promulgated on the subject.

This essay is contributed in the hope that, even if its own arguments are of little value, it may, at least, induce others to investigate the subject on more correct principles than have hitherto been followed.

The postulate with which I commence the inquiry is, to let it be granted that there are such things as *species*, distinct in their characters and permanent in their duration. This being admitted, we define the natural system to be *the arrangement of species according to the degree of resemblance in their essential characters*. In other words, the natural system is that arrangement in which the distance from each species to every other is in exact proportion to the degree in which the essential characters of the respective species agree. Hence it follows that the whole difficulty of discovering the natural system consists in forming a right estimate of these degrees of resemblance. For the degree in which one species resembles another must not be estimated merely by the conspicuousness or numerical amount of the points of agreement, but also by the physiological importance of these characters to the existence of the species. On this point no certain rules have yet been laid down; for though naturalists in general admit, for instance, that the

* Read before the Zoological Section at Glasgow, Sept. 21, 1840.

6. Henricia, Gray. Linckia, *Forbes* not *Nardo*.

The rays 5, rounded, tapering, with rounded tubercles near the ambulacra; the dorsal wart obscure, few rayed, often hidden with small spines.

1. *Henricia oculata*, Gray. Asterias oculata, *Penn.* Asterias sepositia, *Penn.*? Rays 5, closely reticulated with small spines.

Inhab. European Ocean.

[To be continued.]

---

XXIII.—*On the true Method of discovering the Natural System in Zoology and Botany.* By Hugh E. Strickland, M.A., F.G.S., &c.*

It is probable that most naturalists at the present day have an instinctive belief in the existence of a natural system in Zoology and Botany, but there are very few who if questioned on the subject could give any clear explanation of the grounds of their belief, of the nature of that system, or of the mode by which a knowledge of it may be attained. The uncertainty which hangs over the subject is doubtless owing to the obscure and metaphysical nature of some of the principles involved, and still more to the vague conceptions and crude theories which have been promulgated on the subject.

This essay is contributed in the hope that, even if its own arguments are of little value, it may, at least, induce others to investigate the subject on more correct principles than have hitherto been followed.

The postulate with which I commence the inquiry is, to let it be granted that there are such things as *species*, distinct in their characters and permanent in their duration. This being admitted, we define the natural system to be *the arrangement of species according to the degree of resemblance in their essential characters*. In other words, the natural system is that arrangement in which the distance from each species to every other is in exact proportion to the degree in which the essential characters of the respective species agree. Hence it follows that the whole difficulty of discovering the natural system consists in forming a right estimate of these degrees of resemblance. For the degree in which one species resembles another must not be estimated merely by the conspicuousness or numerical amount of the points of agreement, but also by the physiological importance of these characters to the existence of the species. On this point no certain rules have yet been laid down; for though naturalists in general admit, for instance, that the

* Read before the Zoological Section at Glasgow, Sept. 21, 1840.

6. Henricia, Gray. Linckia, *Forbes* not *Nardo*.

The rays 5, rounded, tapering, with rounded tubercles near the ambulacra; the dorsal wart obscure, few rayed, often hidden with small spines.

1. *Henricia oculata*, Gray. Asterias oculata, *Penn.* Asterias sepositia, *Penn.*? Rays 5, closely reticulated with small spines.

Inhab. European Ocean.

[To be continued.]

---

XXIII.—*On the true Method of discovering the Natural System in Zoology and Botany.* By Hugh E. Strickland, M.A., F.G.S., &c.*

It is probable that most naturalists at the present day have an instinctive belief in the existence of a natural system in Zoology and Botany, but there are very few who if questioned on the subject could give any clear explanation of the grounds of their belief, of the nature of that system, or of the mode by which a knowledge of it may be attained. The uncertainty which hangs over the subject is doubtless owing to the obscure and metaphysical nature of some of the principles involved, and still more to the vague conceptions and crude theories which have been promulgated on the subject.

This essay is contributed in the hope that, even if its own arguments are of little value, it may, at least, induce others to investigate the subject on more correct principles than have hitherto been followed.

The postulate with which I commence the inquiry is, to let it be granted that there are such things as *species*, distinct in their characters and permanent in their duration. This being admitted, we define the natural system to be *the arrangement of species according to the degree of resemblance in their essential characters*. In other words, the natural system is that arrangement in which the distance from each species to every other is in exact proportion to the degree in which the essential characters of the respective species agree. Hence it follows that the whole difficulty of discovering the natural system consists in forming a right estimate of these degrees of resemblance. For the degree in which one species resembles another must not be estimated merely by the conspicuousness or numerical amount of the points of agreement, but also by the physiological importance of these characters to the existence of the species. On this point no certain rules have yet been laid down; for though naturalists in general admit, for instance, that the

* Read before the Zoological Section at Glasgow, Sept. 21, 1840.

nervous system is superior in importance to the circulatory, and the latter superior to the digestive system, yet this subject is still in a very indeterminate state, and until our knowledge of physiology is much further advanced, disputes will always arise respecting the true position of certain species in the natural classification. Such differences of opinion, however, will continually diminish as our knowledge increases, and they are even now very few in comparison with the numerous facts in classification on which all naturalists are agreed. Much may be effected by education and habit, which impart to the naturalist a peculiar faculty (termed by Linnæus a "latent instinct") for appreciating the relative importance of physiological characters to the satisfaction of himself and others, even in cases where he is unable to explain the principles which determine his decision.

Granting, then, that by combining the *number* of points in which any two species agree, with an estimate of the *physiological importance* of those several points of agreement, the naturalist may, in practice, form a tolerably exact conception of the *degree of resemblance* between them; he will proceed in his construction of the natural system to place these species at greater or less distance from each other, in proportion to that degree of resemblance. If we suppose that by a repetition of this process every species is placed in its true position, we obtain a definition of those much-disputed terms, *affinity* and *analogy*,—the former of which consists in those *essential* and *important* resemblances which determine the place of a species in the natural system, while the latter term (analogy) expresses those *unessential* and (so to speak) *accidental* resemblances which sometimes occur between distantly allied species without influencing their position in the system. With *analogy*, therefore, we have no further concern in the present discourse, as it is a principle in no way involved in the natural system. *Affinity*, on the contrary, forms the chief element in this inquiry; and to place species in the order of their affinities is to construct the natural system*.

It appears from the above views that the natural system is an accumulation of facts which are to be arrived at only by a slow inductive process, similar to that by which a country is geographically surveyed. If this be true, it is evident how

* I am aware that by many naturalists analogy is considered to be as important an element in the natural system as affinity is. As the discussion of this question would lead us away from the present object, I will not enter upon it now, especially as my views respecting it are stated more at large in the Mag. of Nat. Hist. for May last, p. 222 *et seq.*

nervous system is superior in importance to the circulatory, and the latter superior to the digestive system, yet this subject is still in a very indeterminate state, and until our knowledge of physiology is much further advanced, disputes will always arise respecting the true position of certain species in the natural classification. Such differences of opinion, however, will continually diminish as our knowledge increases, and they are even now very few in comparison with the numerous facts in classification on which all naturalists are agreed. Much may be effected by education and habit, which impart to the naturalist a peculiar faculty (termed by Linnæus a "latent instinct") for appreciating the relative importance of physiological characters to the satisfaction of himself and others, even in cases where he is unable to explain the principles which determine his decision.

Granting, then, that by combining the *number* of points in which any two species agree, with an estimate of the *physiological importance* of those several points of agreement, the naturalist may, in practice, form a tolerably exact conception of the *degree of resemblance* between them; he will proceed in his construction of the natural system to place these species at greater or less distance from each other, in proportion to that degree of resemblance. If we suppose that by a repetition of this process every species is placed in its true position, we obtain a definition of those much-disputed terms, *affinity* and *analogy*,—the former of which consists in those *essential* and *important* resemblances which determine the place of a species in the natural system, while the latter term (analogy) expresses those *unessential* and (so to speak) *accidental* resemblances which sometimes occur between distantly allied species without influencing their position in the system. With *analogy*, therefore, we have no further concern in the present discourse, as it is a principle in no way involved in the natural system. *Affinity*, on the contrary, forms the chief element in this inquiry; and to place species in the order of their affinities is to construct the natural system*.

It appears from the above views that the natural system is an accumulation of facts which are to be arrived at only by a slow inductive process, similar to that by which a country is geographically surveyed. If this be true, it is evident how

* I am aware that by many naturalists analogy is considered to be as important an element in the natural system as affinity is. As the discussion of this question would lead us away from the present object, I will not enter upon it now, especially as my views respecting it are stated more at large in the Mag. of Nat. Hist. for May last, p. 222 *et seq.*

nervous system is superior in importance to the circulatory, and the latter superior to the digestive system, yet this subject is still in a very indeterminate state, and until our knowledge of physiology is much further advanced, disputes will always arise respecting the true position of certain species in the natural classification. Such differences of opinion, however, will continually diminish as our knowledge increases, and they are even now very few in comparison with the numerous facts in classification on which all naturalists are agreed. Much may be effected by education and habit, which impart to the naturalist a peculiar faculty (termed by Linnæus a "latent instinct") for appreciating the relative importance of physiological characters to the satisfaction of himself and others, even in cases where he is unable to explain the principles which determine his decision.

Granting, then, that by combining the *number* of points in which any two species agree, with an estimate of the *physiological importance* of those several points of agreement, the naturalist may, in practice, form a tolerably exact conception of the *degree of resemblance* between them; he will proceed in his construction of the natural system to place these species at greater or less distance from each other, in proportion to that degree of resemblance. If we suppose that by a repetition of this process every species is placed in its true position, we obtain a definition of those much-disputed terms, *affinity* and *analogy*,—the former of which consists in those *essential* and *important* resemblances which determine the place of a species in the natural system, while the latter term (analogy) expresses those *unessential* and (so to speak) *accidental* resemblances which sometimes occur between distantly allied species without influencing their position in the system. With *analogy*, therefore, we have no further concern in the present discourse, as it is a principle in no way involved in the natural system. *Affinity*, on the contrary, forms the chief element in this inquiry; and to place species in the order of their affinities is to construct the natural system*.

It appears from the above views that the natural system is an accumulation of facts which are to be arrived at only by a slow inductive process, similar to that by which a country is geographically surveyed. If this be true, it is evident how

* I am aware that by many naturalists analogy is considered to be as important an element in the natural system as affinity is. As the discussion of this question would lead us away from the present object, I will not enter upon it now, especially as my views respecting it are stated more at large in the Mag. of Nat. Hist. for May last, p. 222 *et seq.*

erroneous must be all those methods which commence by assuming an *à priori* system, and then attempt to classify all created organisms in conformity with that system. This, nevertheless, is a defect which exists more or less in many modern methods of classification. The greater part of these arrangements are based on an assumption that organic beings have been created on a regular and symmetrical plan, to which all true classifications must conform. Some naturalists have attempted to place all animal species in a straight line, descending from man to a monad. This theory assumes that each species (excepting the two extremes) has two and only two direct affinities; one, namely, with the species which precedes, and the other with that which follows it. Others, perceiving the existence in many cases of more than two direct affinities, have compared the natural system to a series of circles, or to the reticulations of network. Many authors have assigned the most mathematical symmetry to the different parts of the system by maintaining the prevalence throughout of a constant number, such as 2, 3, 4, 5, or 7. In applying these views to facts, they have of course found numerous exceptions to the regularity of their assumed formulæ; but by adducing the extermination of some species, and our ignorance of the existence of others, and by applying a Procrustean process to those groups which were either larger or smaller than the regulation standard, they have removed the most glaring objections to their theory, and have with wonderful ingenuity given their systems an appearance of truth*. But when the unprejudiced naturalist attempts to apply any one of these systems to Nature, he soon perceives their inefficiency in expressing the real *order of affinities*. The fact is, that they all labour under the vital error of assuming that to be symmetrical, which is in an eminent degree irregular and devoid of symmetry. I will now proceed to give my reasons for taking this view of the subject.

1. *A priori* considerations, so far from leading us to assume a *regular geometrical pattern*, or *numerical property* in the

* As these remarks may appear somewhat severe, it is right to substantiate them by a few examples. So long as these systems are admitted by their authors to be *artificial*, it would be as unjust to object to them, as to complain of the alphabetical arrangement of an encyclopædia, that it broke the connection of the subjects. The reply would of course be, that an encyclopædia does not profess to arrange subjects in their natural order, but merely aims at convenience of reference. The remarks in the text, therefore, merely apply to those *symmetrical* methods which profess to exhibit *The Natural System*. The examples are selected from Mr. Swainson's 'Classification of Birds,' in which work the *reality* of the quinary system is insisted on throughout. See Appendix.

erroneous must be all those methods which commence by assuming an *à priori* system, and then attempt to classify all created organisms in conformity with that system. This, nevertheless, is a defect which exists more or less in many modern methods of classification. The greater part of these arrangements are based on an assumption that organic beings have been created on a regular and symmetrical plan, to which all true classifications must conform. Some naturalists have attempted to place all animal species in a straight line, descending from man to a monad. This theory assumes that each species (excepting the two extremes) has two and only two direct affinities; one, namely, with the species which precedes, and the other with that which follows it. Others, perceiving the existence in many cases of more than two direct affinities, have compared the natural system to a series of circles, or to the reticulations of network. Many authors have assigned the most mathematical symmetry to the different parts of the system by maintaining the prevalence throughout of a constant number, such as 2, 3, 4, 5, or 7. In applying these views to facts, they have of course found numerous exceptions to the regularity of their assumed formulæ; but by adducing the extermination of some species, and our ignorance of the existence of others, and by applying a Procrustean process to those groups which were either larger or smaller than the regulation standard, they have removed the most glaring objections to their theory, and have with wonderful ingenuity given their systems an appearance of truth*. But when the unprejudiced naturalist attempts to apply any one of these systems to Nature, he soon perceives their inefficiency in expressing the real *order of affinities*. The fact is, that they all labour under the vital error of assuming that to be symmetrical, which is in an eminent degree irregular and devoid of symmetry. I will now proceed to give my reasons for taking this view of the subject.

1. *A priori* considerations, so far from leading us to assume a *regular geometrical pattern*, or *numerical property* in the

* As these remarks may appear somewhat severe, it is right to substantiate them by a few examples. So long as these systems are admitted by their authors to be *artificial*, it would be as unjust to object to them, as to complain of the alphabetical arrangement of an encyclopædia, that it broke the connection of the subjects. The reply would of course be, that an encyclopædia does not profess to arrange subjects in their natural order, but merely aims at convenience of reference. The remarks in the text, therefore, merely apply to those *symmetrical* methods which profess to exhibit *The Natural System*. The examples are selected from Mr. Swainson's 'Classification of Birds,' in which work the *reality* of the quinary system is insisted on throughout. See Appendix.

erroneous must be all those methods which commence by assuming an *à priori* system, and then attempt to classify all created organisms in conformity with that system. This, nevertheless, is a defect which exists more or less in many modern methods of classification. The greater part of these arrangements are based on an assumption that organic beings have been created on a regular and symmetrical plan, to which all true classifications must conform. Some naturalists have attempted to place all animal species in a straight line, descending from man to a monad. This theory assumes that each species (excepting the two extremes) has two and only two direct affinities; one, namely, with the species which precedes, and the other with that which follows it. Others, perceiving the existence in many cases of more than two direct affinities, have compared the natural system to a series of circles, or to the reticulations of network. Many authors have assigned the most mathematical symmetry to the different parts of the system by maintaining the prevalence throughout of a constant number, such as 2, 3, 4, 5, or 7. In applying these views to facts, they have of course found numerous exceptions to the regularity of their assumed formulæ; but by adducing the extermination of some species, and our ignorance of the existence of others, and by applying a Procrustean process to those groups which were either larger or smaller than the regulation standard, they have removed the most glaring objections to their theory, and have with wonderful ingenuity given their systems an appearance of truth*. But when the unprejudiced naturalist attempts to apply any one of these systems to Nature, he soon perceives their inefficiency in expressing the real *order of affinities*. The fact is, that they all labour under the vital error of assuming that to be symmetrical, which is in an eminent degree irregular and devoid of symmetry. I will now proceed to give my reasons for taking this view of the subject.

1. *A priori* considerations, so far from leading us to assume a *regular geometrical pattern*, or *numerical property* in the

* As these remarks may appear somewhat severe, it is right to substantiate them by a few examples. So long as these systems are admitted by their authors to be *artificial*, it would be as unjust to object to them, as to complain of the alphabetical arrangement of an encyclopædia, that it broke the connection of the subjects. The reply would of course be, that an encyclopædia does not profess to arrange subjects in their natural order, but merely aims at convenience of reference. The remarks in the text, therefore, merely apply to those *symmetrical* methods which profess to exhibit *The Natural System*. The examples are selected from Mr. Swainson's 'Classification of Birds,' in which work the *reality* of the quinary system is insisted on throughout. See Appendix.

groups of organized beings, appear to indicate the direct contrary; for the analogies of external nature all indicate the utmost variety and irregularity. Beautiful as are the examples of creative design exhibited in the universe, and admirable as are the adaptations of one part of nature to another, there is no department of the creation which is tied down to mathematical laws and numerical properties further than is sufficient for the due performance of its destined functions. There are indeed certain mathematical laws which regulate the motions of bodies and their chemical combinations, but these do not give to the face of nature that symmetrical and *artificial* appearance which is aimed at by the zoological systems above-mentioned. For example, the relative distances of the planets, their magnitudes, and the number of their satellites conform to no known numerical law. The fixed stars exhibit no regular arrangement, either in their magnitudes, distances, or positions, but appear scattered at random across the sky. To descend to our own earth, no symmetry is traceable in the forms of islands or continents, the courses of rivers, or the directions of mountain-chains. Organic life exhibits the same irregularity,—no two plants, and no two leaves of the same plant were ever perfectly identical in size, shape, colour, and position. In the "human face divine," portrait-painters affirm that the two sides never correspond; and even when the external form of an animal exhibits an appearance of bilateral or radiate symmetry, nature departs from it in her arrangement of the internal structure. In short, variety is a great and a most beautiful law of Nature; it is that which distinguishes her productions from those of art, and it is that which man often exerts his highest efforts in vain to imitate. When, therefore, we find a system of classification proposed as the natural one which departs from this universal law of variety, and fetters the organic creation down to one unalterable geometrical figure or arithmetical number, there is, I think, a strong *à priori* presumption that such a system is the work not of nature but of art.

2. It follows from the irregularity of external nature, as seen on the surface of the earth, that the groups of organized beings *must* be irregular also, both in their magnitudes and in their affinities. In proof of this it must be granted that the final cause of the creation of every animal and plant is the discharge of a certain definite function in nature, and not the mere occupation of a certain post in the classification: in short, that the design of creation was to form not a cabinet of curiosities, but a living world. Few, I trust, would hesitate to admit this proposition. If, then, the different modifi-

groups of organized beings, appear to indicate the direct contrary; for the analogies of external nature all indicate the utmost variety and irregularity. Beautiful as are the examples of creative design exhibited in the universe, and admirable as are the adaptations of one part of nature to another, there is no department of the creation which is tied down to mathematical laws and numerical properties further than is sufficient for the due performance of its destined functions. There are indeed certain mathematical laws which regulate the motions of bodies and their chemical combinations, but these do not give to the face of nature that symmetrical and *artificial* appearance which is aimed at by the zoological systems above-mentioned. For example, the relative distances of the planets, their magnitudes, and the number of their satellites conform to no known numerical law. The fixed stars exhibit no regular arrangement, either in their magnitudes, distances, or positions, but appear scattered at random across the sky. To descend to our own earth, no symmetry is traceable in the forms of islands or continents, the courses of rivers, or the directions of mountain-chains. Organic life exhibits the same irregularity,—no two plants, and no two leaves of the same plant were ever perfectly identical in size, shape, colour, and position. In the "human face divine," portrait-painters affirm that the two sides never correspond; and even when the external form of an animal exhibits an appearance of bilateral or radiate symmetry, nature departs from it in her arrangement of the internal structure. In short, variety is a great and a most beautiful law of Nature; it is that which distinguishes her productions from those of art, and it is that which man often exerts his highest efforts in vain to imitate. When, therefore, we find a system of classification proposed as the natural one which departs from this universal law of variety, and fetters the organic creation down to one unalterable geometrical figure or arithmetical number, there is, I think, a strong *à priori* presumption that such a system is the work not of nature but of art.

2. It follows from the irregularity of external nature, as seen on the surface of the earth, that the groups of organized beings *must* be irregular also, both in their magnitudes and in their affinities. In proof of this it must be granted that the final cause of the creation of every animal and plant is the discharge of a certain definite function in nature, and not the mere occupation of a certain post in the classification: in short, that the design of creation was to form not a cabinet of curiosities, but a living world. Few, I trust, would hesitate to admit this proposition. If, then, the different modifi-

groups of organized beings, appear to indicate the direct contrary; for the analogies of external nature all indicate the utmost variety and irregularity. Beautiful as are the examples of creative design exhibited in the universe, and admirable as are the adaptations of one part of nature to another, there is no department of the creation which is tied down to mathematical laws and numerical properties further than is sufficient for the due performance of its destined functions. There are indeed certain mathematical laws which regulate the motions of bodies and their chemical combinations, but these do not give to the face of nature that symmetrical and *artificial* appearance which is aimed at by the zoological systems above-mentioned. For example, the relative distances of the planets, their magnitudes, and the number of their satellites conform to no known numerical law. The fixed stars exhibit no regular arrangement, either in their magnitudes, distances, or positions, but appear scattered at random across the sky. To descend to our own earth, no symmetry is traceable in the forms of islands or continents, the courses of rivers, or the directions of mountain-chains. Organic life exhibits the same irregularity,—no two plants, and no two leaves of the same plant were ever perfectly identical in size, shape, colour, and position. In the "human face divine," portrait-painters affirm that the two sides never correspond; and even when the external form of an animal exhibits an appearance of bilateral or radiate symmetry, nature departs from it in her arrangement of the internal structure. In short, variety is a great and a most beautiful law of Nature; it is that which distinguishes her productions from those of art, and it is that which man often exerts his highest efforts in vain to imitate. When, therefore, we find a system of classification proposed as the natural one which departs from this universal law of variety, and fetters the organic creation down to one unalterable geometrical figure or arithmetical number, there is, I think, a strong *à priori* presumption that such a system is the work not of nature but of art.

2. It follows from the irregularity of external nature, as seen on the surface of the earth, that the groups of organized beings *must* be irregular also, both in their magnitudes and in their affinities. In proof of this it must be granted that the final cause of the creation of every animal and plant is the discharge of a certain definite function in nature, and not the mere occupation of a certain post in the classification: in short, that the design of creation was to form not a cabinet of curiosities, but a living world. Few, I trust, would hesitate to admit this proposition. If, then, the different modifi-

cations of structure which constitute the characters of groups were given solely with reference to the external circumstances in which the creature is destined to live, it follows that the irregularities of the external world must be impressed upon the groups of animals and of plants which inhabit it. The supply of organic beings is exactly proportioned to the demand; and Nature does not, for the sake of producing a regular classification, go out of her way to create beings where they are not wanted, or where they could not subsist. Thus, for instance, the warm climate and varied soil of the tropics admits of the growth of a vast variety of flowers and fruits. The group of Humming-birds which feed on the former, and of Parrots which feed on the latter, are accordingly found to be developed in a vast variety of generic and specific forms; while the family of Gulls which seek their food in the monotonous and thinly inhabited regions of the north, are few in species and still fewer in genera. Again, the variety of plants in the tropics admits the existence of a great variety of insects, and the family of Woodpeckers is proportionately numerous; while the Oxpecker (*Buphaga*), which seems to form a group fully equivalent in value to the Woodpeckers, is limited to but one or two species, because its food is confined to a few species of insects which only infest the backs of oxen.

It follows, then, that the groups of organized beings will be great or small, and the series of affinities will be broken or continuous, solely as the variations of external circumstances admit of their existence, and not according to any rule of classification. If, indeed, we were to imagine a world laid out with the regularity of a Chinese garden, in which a certain number of islands agreeing in size, shape, soil, and form of surface, were placed at exactly equal distances on both sides of the equator, we might then conceive the possibility of a perfect symmetry in the groups of beings which inhabit them; but without some such supposition, I do not see how a class of animals or plants can be symmetrical in themselves, and yet be expressly adapted for conditions of existence which are eminently irregular.

3. To pass from syllogism to induction, it is most certainly not the case that any definite number or geometrical property runs through the animal or vegetable kingdom. I do not wish on the present occasion to enter on any criticism of individual systems, but it would be easy to show that no *symmetrical* system yet proposed is a true picture of the real series of affinities. Without referring to the numerous gaps in these systems which are referred by their authors to species

cations of structure which constitute the characters of groups were given solely with reference to the external circumstances in which the creature is destined to live, it follows that the irregularities of the external world must be impressed upon the groups of animals and of plants which inhabit it. The supply of organic beings is exactly proportioned to the demand; and Nature does not, for the sake of producing a regular classification, go out of her way to create beings where they are not wanted, or where they could not subsist. Thus, for instance, the warm climate and varied soil of the tropics admits of the growth of a vast variety of flowers and fruits. The group of Humming-birds which feed on the former, and of Parrots which feed on the latter, are accordingly found to be developed in a vast variety of generic and specific forms; while the family of Gulls which seek their food in the monotonous and thinly inhabited regions of the north, are few in species and still fewer in genera. Again, the variety of plants in the tropics admits the existence of a great variety of insects, and the family of Woodpeckers is proportionately numerous; while the Oxpecker (*Buphaga*), which seems to form a group fully equivalent in value to the Woodpeckers, is limited to but one or two species, because its food is confined to a few species of insects which only infest the backs of oxen.

It follows, then, that the groups of organized beings will be great or small, and the series of affinities will be broken or continuous, solely as the variations of external circumstances admit of their existence, and not according to any rule of classification. If, indeed, we were to imagine a world laid out with the regularity of a Chinese garden, in which a certain number of islands agreeing in size, shape, soil, and form of surface, were placed at exactly equal distances on both sides of the equator, we might then conceive the possibility of a perfect symmetry in the groups of beings which inhabit them; but without some such supposition, I do not see how a class of animals or plants can be symmetrical in themselves, and yet be expressly adapted for conditions of existence which are eminently irregular.

3. To pass from syllogism to induction, it is most certainly not the case that any definite number or geometrical property runs through the animal or vegetable kingdom. I do not wish on the present occasion to enter on any criticism of individual systems, but it would be easy to show that no *symmetrical* system yet proposed is a true picture of the real series of affinities. Without referring to the numerous gaps in these systems which are referred by their authors to species

cations of structure which constitute the characters of groups were given solely with reference to the external circumstances in which the creature is destined to live, it follows that the irregularities of the external world must be impressed upon the groups of animals and of plants which inhabit it. The supply of organic beings is exactly proportioned to the demand; and Nature does not, for the sake of producing a regular classification, go out of her way to create beings where they are not wanted, or where they could not subsist. Thus, for instance, the warm climate and varied soil of the tropics admits of the growth of a vast variety of flowers and fruits. The group of Humming-birds which feed on the former, and of Parrots which feed on the latter, are accordingly found to be developed in a vast variety of generic and specific forms; while the family of Gulls which seek their food in the monotonous and thinly inhabited regions of the north, are few in species and still fewer in genera. Again, the variety of plants in the tropics admits the existence of a great variety of insects, and the family of Woodpeckers is proportionately numerous; while the Oxpecker (*Buphaga*), which seems to form a group fully equivalent in value to the Woodpeckers, is limited to but one or two species, because its food is confined to a few species of insects which only infest the backs of oxen.

It follows, then, that the groups of organized beings will be great or small, and the series of affinities will be broken or continuous, solely as the variations of external circumstances admit of their existence, and not according to any rule of classification. If, indeed, we were to imagine a world laid out with the regularity of a Chinese garden, in which a certain number of islands agreeing in size, shape, soil, and form of surface, were placed at exactly equal distances on both sides of the equator, we might then conceive the possibility of a perfect symmetry in the groups of beings which inhabit them; but without some such supposition, I do not see how a class of animals or plants can be symmetrical in themselves, and yet be expressly adapted for conditions of existence which are eminently irregular.

3. To pass from syllogism to induction, it is most certainly not the case that any definite number or geometrical property runs through the animal or vegetable kingdom. I do not wish on the present occasion to enter on any criticism of individual systems, but it would be easy to show that no *symmetrical* system yet proposed is a true picture of the real series of affinities. Without referring to the numerous gaps in these systems which are referred by their authors to species

being extinct or unknown, I could point out numerous examples in which natural affinities are violated, insignificant groups promoted, or important ones reduced to the ranks, in the vain endeavour to drill the irregular troops of Nature into the square, the column, and the phalanx*. And although in some cases we do find examples of the recurrence of a certain number in the subdivisions of natural groups, yet when we remember the ease with which groups may be extended or curtailed to support a theory, the numerous exceptions which occur to these numbers, and the variety of numerical theories which have been maintained with equal firmness by different authors, we cannot, I think, regard these occasional coincidences of number as otherwise than accidental.

If, then, the diversities of organic structure, being adapted to the varying conditions of the earth's surface, are, like them, full of irregularity and variety, it is plain that we can no more speculate theoretically as to what groups are likely to remain undiscovered, than we can predict the discovery of rivers, lakes or islands in any unexplored portion of the earth's surface. Both inquiries must be pursued in the same way, viz. by a careful induction of facts; and it will be found that there is much analogy between the process here recommended and that of a geographical survey. The plan proposed is to take any species, A, and ask the question, What are its nearest affinities? If, after an examination of its points of resemblance to all other known species, it should appear that there are two other species, B and C, which closely approach it in structure, and that A is intermediate between them, the question is answered, and the formula B A C would express a portion of the natural system, the survey of which is so far completed. Then take C, and ask the same question. One of its affinities, that of C to A, is already determined; and we will suppose that D is found to form its nearest affinity on the other side. Then B A C D will represent four species, the relative affinities of which are determined. By a repetition of this process, supposing our knowledge of the structure of each species to be complete, and our rules for determining the degrees of affinity correct, the whole organized creation might be ultimately arranged in the order of its affinities, and our survey of the natural system would then be finally effected. Now, if each species never had more than two affinities, and those in opposite directions, as in the above example, the natural system would form a straight line, as some authors have assumed it to be. But we shall often find, in

* See Appendix.

being extinct or unknown, I could point out numerous examples in which natural affinities are violated, insignificant groups promoted, or important ones reduced to the ranks, in the vain endeavour to drill the irregular troops of Nature into the square, the column, and the phalanx*. And although in some cases we do find examples of the recurrence of a certain number in the subdivisions of natural groups, yet when we remember the ease with which groups may be extended or curtailed to support a theory, the numerous exceptions which occur to these numbers, and the variety of numerical theories which have been maintained with equal firmness by different authors, we cannot, I think, regard these occasional coincidences of number as otherwise than accidental.

If, then, the diversities of organic structure, being adapted to the varying conditions of the earth's surface, are, like them, full of irregularity and variety, it is plain that we can no more speculate theoretically as to what groups are likely to remain undiscovered, than we can predict the discovery of rivers, lakes or islands in any unexplored portion of the earth's surface. Both inquiries must be pursued in the same way, viz. by a careful induction of facts; and it will be found that there is much analogy between the process here recommended and that of a geographical survey. The plan proposed is to take any species, A, and ask the question, What are its nearest affinities? If, after an examination of its points of resemblance to all other known species, it should appear that there are two other species, B and C, which closely approach it in structure, and that A is intermediate between them, the question is answered, and the formula B A C would express a portion of the natural system, the survey of which is so far completed. Then take C, and ask the same question. One of its affinities, that of C to A, is already determined; and we will suppose that D is found to form its nearest affinity on the other side. Then B A C D will represent four species, the relative affinities of which are determined. By a repetition of this process, supposing our knowledge of the structure of each species to be complete, and our rules for determining the degrees of affinity correct, the whole organized creation might be ultimately arranged in the order of its affinities, and our survey of the natural system would then be finally effected. Now, if each species never had more than two affinities, and those in opposite directions, as in the above example, the natural system would form a straight line, as some authors have assumed it to be. But we shall often find, in

* See Appendix.

being extinct or unknown, I could point out numerous examples in which natural affinities are violated, insignificant groups promoted, or important ones reduced to the ranks, in the vain endeavour to drill the irregular troops of Nature into the square, the column, and the phalanx*. And although in some cases we do find examples of the recurrence of a certain number in the subdivisions of natural groups, yet when we remember the ease with which groups may be extended or curtailed to support a theory, the numerous exceptions which occur to these numbers, and the variety of numerical theories which have been maintained with equal firmness by different authors, we cannot, I think, regard these occasional coincidences of number as otherwise than accidental.

If, then, the diversities of organic structure, being adapted to the varying conditions of the earth's surface, are, like them, full of irregularity and variety, it is plain that we can no more speculate theoretically as to what groups are likely to remain undiscovered, than we can predict the discovery of rivers, lakes or islands in any unexplored portion of the earth's surface. Both inquiries must be pursued in the same way, viz. by a careful induction of facts; and it will be found that there is much analogy between the process here recommended and that of a geographical survey. The plan proposed is to take any species, A, and ask the question, What are its nearest affinities? If, after an examination of its points of resemblance to all other known species, it should appear that there are two other species, B and C, which closely approach it in structure, and that A is intermediate between them, the question is answered, and the formula B A C would express a portion of the natural system, the survey of which is so far completed. Then take C, and ask the same question. One of its affinities, that of C to A, is already determined; and we will suppose that D is found to form its nearest affinity on the other side. Then B A C D will represent four species, the relative affinities of which are determined. By a repetition of this process, supposing our knowledge of the structure of each species to be complete, and our rules for determining the degrees of affinity correct, the whole organized creation might be ultimately arranged in the order of its affinities, and our survey of the natural system would then be finally effected. Now, if each species never had more than two affinities, and those in opposite directions, as in the above example, the natural system would form a straight line, as some authors have assumed it to be. But we shall often find, in

* See Appendix.

fact, that a species has only one direct affinity, and in other cases that it has three or more, showing the existence of lateral ramifications instead of a simple line; as shown in this example, where C, besides its affinity to A and D, has an affinity to a third species, E, which therefore forms a lateral ramification.


It was the observation of this fact which led some naturalists to adopt the circular instead of the linear theory, still adhering to the assumption of a symmetrical figure, but changing their notions of its form. Now although we find occasional ramifications in the affinities, and although these ramifications may occasionally anastomose and form a circle, yet it has been shown that the doctrine of a regular figure cannot be sustained, and therefore if even it be permitted to man to discover what the true figure is which will express all the affinities of organic bodies, it can only be effected by constructing it piecemeal in the way above proposed. All that we can say at present is, that ramifications of affinities exist; but whether they are so simple as to admit of being correctly depicted on a plane surface, or whether, as is more probable, they assume the form of an irregular solid, it is premature to decide. They may even be of so complicated a nature that they cannot be correctly expressed by terms of space, but are like those algebraical formulæ which are beyond the powers of the geometrician to depict. Without, however, going deeper into this obscure question, let us hope that the affinities of the natural system will not be of a higher order than can be expressed by a solid figure; in which case they may be shown with tolerable accuracy on a plain surface; just as the surface of the earth, though an irregular spheroid, can be protracted on a map. The natural system may, perhaps, be most truly compared to an irregularly branching tree, or rather to an assemblage of detached trees and shrubs of various sizes and modes of growth*. And as we show the form of a tree by sketching it on paper, or by drawing its individual branches and leaves, so may the natural system be drawn on a map, and its several parts shown in greater detail on a series of maps.

* If this illustration should prove to be a just one, the order of affinities might be shown in museums in a pleasing manner by constructing an artificial tree, whose ramifications should correspond with those of any given family of birds, and by then placing on its branches a stuffed specimen of each genus in their true order.

fact, that a species has only one direct affinity, and in other cases that it has three or more, showing the existence of lateral ramifications instead of a simple line; as shown in this example, where C, besides its affinity to A and D, has an affinity to a third species, E, which therefore forms a lateral ramification.


It was the observation of this fact which led some naturalists to adopt the circular instead of the linear theory, still adhering to the assumption of a symmetrical figure, but changing their notions of its form. Now although we find occasional ramifications in the affinities, and although these ramifications may occasionally anastomose and form a circle, yet it has been shown that the doctrine of a regular figure cannot be sustained, and therefore if even it be permitted to man to discover what the true figure is which will express all the affinities of organic bodies, it can only be effected by constructing it piecemeal in the way above proposed. All that we can say at present is, that ramifications of affinities exist; but whether they are so simple as to admit of being correctly depicted on a plane surface, or whether, as is more probable, they assume the form of an irregular solid, it is premature to decide. They may even be of so complicated a nature that they cannot be correctly expressed by terms of space, but are like those algebraical formulæ which are beyond the powers of the geometrician to depict. Without, however, going deeper into this obscure question, let us hope that the affinities of the natural system will not be of a higher order than can be expressed by a solid figure; in which case they may be shown with tolerable accuracy on a plain surface; just as the surface of the earth, though an irregular spheroid, can be protracted on a map. The natural system may, perhaps, be most truly compared to an irregularly branching tree, or rather to an assemblage of detached trees and shrubs of various sizes and modes of growth*. And as we show the form of a tree by sketching it on paper, or by drawing its individual branches and leaves, so may the natural system be drawn on a map, and its several parts shown in greater detail on a series of maps.

* If this illustration should prove to be a just one, the order of affinities might be shown in museums in a pleasing manner by constructing an artificial tree, whose ramifications should correspond with those of any given family of birds, and by then placing on its branches a stuffed specimen of each genus in their true order.

fact, that a species has only one direct affinity, and in other cases that it has three or more, showing the existence of lateral ramifications instead of a simple line; as shown in this example, where C, besides its affinity to A and D, has an affinity to a third species, E, which therefore forms a lateral ramification.


It was the observation of this fact which led some naturalists to adopt the circular instead of the linear theory, still adhering to the assumption of a symmetrical figure, but changing their notions of its form. Now although we find occasional ramifications in the affinities, and although these ramifications may occasionally anastomose and form a circle, yet it has been shown that the doctrine of a regular figure cannot be sustained, and therefore if even it be permitted to man to discover what the true figure is which will express all the affinities of organic bodies, it can only be effected by constructing it piecemeal in the way above proposed. All that we can say at present is, that ramifications of affinities exist; but whether they are so simple as to admit of being correctly depicted on a plane surface, or whether, as is more probable, they assume the form of an irregular solid, it is premature to decide. They may even be of so complicated a nature that they cannot be correctly expressed by terms of space, but are like those algebraical formulæ which are beyond the powers of the geometrician to depict. Without, however, going deeper into this obscure question, let us hope that the affinities of the natural system will not be of a higher order than can be expressed by a solid figure; in which case they may be shown with tolerable accuracy on a plain surface; just as the surface of the earth, though an irregular spheroid, can be protracted on a map. The natural system may, perhaps, be most truly compared to an irregularly branching tree, or rather to an assemblage of detached trees and shrubs of various sizes and modes of growth*. And as we show the form of a tree by sketching it on paper, or by drawing its individual branches and leaves, so may the natural system be drawn on a map, and its several parts shown in greater detail on a series of maps.

* If this illustration should prove to be a just one, the order of affinities might be shown in museums in a pleasing manner by constructing an artificial tree, whose ramifications should correspond with those of any given family of birds, and by then placing on its branches a stuffed specimen of each genus in their true order.

In order to show that the views here maintained are not chimerical, I will here present one or two *sketch*-maps of different families of birds, though I am well aware that our knowledge of natural history is as yet far too imperfect to pretend to accuracy*. Such sketches as these can be compared only to the rude efforts at map-making made by the ancients, of which the Peutinger Table is an example; and it is probably reserved for a distant age to introduce that degree of exactness into natural history which in modern geography is attained by a trigonometrical survey. For the sake of simplicity, in making these sketches I have omitted the consideration of *species*, but assuming that the genera of modern authors consist solely of closely allied species, I have proceeded to group them in what appeared to be their true position in respect of their affinities. In order to place these groups at their true distances, it is necessary to form a *scale of degrees of affinity*, to which the intervals between each genus shall correspond. I am aware that this scale must be, in some measure, arbitrary; but for this there is no remedy. The division of the fixed stars into *seven* magnitudes is arbitrary also, yet it is found in practice to answer the purpose. It is evident, from the complex ramifications assumed by the natural system, that it is impossible, in a zoological work, to describe each genus or species in the exact order of their affinities, but that leaps must often be made from one part of the system to another, just as in a geographical work we cannot describe the counties of Great Britain in their exact order of position, but must continually make lateral digressions, and then return to the main line of our route. So in anatomy, we not only cannot study or describe the several parts in the order in which they join each other in the human body, but each part must even be dissected out from the rest, and removed from its natural position, before we can comprehend its characters and functions. This is an inconvenience inseparable from the nature of the case, and it is therefore no just complaint to make against a systematic work, that it frequently makes diversions which break the order of affinities. We are therefore at liberty to consult our own convenience, and consequently, whatever may be the form which the natural system, on further survey, may assume, there will be no reason for departing widely from the usual custom of commencing with Mammalia, and proceeding through Birds, Reptiles, and Fish, to the Mollusca, Annulosa, Radiata, &c. Let it not then be objected to the

* See Plate VIII., which exhibits one of these attempts at zoological map-making.

In order to show that the views here maintained are not chimerical, I will here present one or two *sketch*-maps of different families of birds, though I am well aware that our knowledge of natural history is as yet far too imperfect to pretend to accuracy*. Such sketches as these can be compared only to the rude efforts at map-making made by the ancients, of which the Peutinger Table is an example; and it is probably reserved for a distant age to introduce that degree of exactness into natural history which in modern geography is attained by a trigonometrical survey. For the sake of simplicity, in making these sketches I have omitted the consideration of *species*, but assuming that the genera of modern authors consist solely of closely allied species, I have proceeded to group them in what appeared to be their true position in respect of their affinities. In order to place these groups at their true distances, it is necessary to form a *scale of degrees of affinity*, to which the intervals between each genus shall correspond. I am aware that this scale must be, in some measure, arbitrary; but for this there is no remedy. The division of the fixed stars into *seven* magnitudes is arbitrary also, yet it is found in practice to answer the purpose. It is evident, from the complex ramifications assumed by the natural system, that it is impossible, in a zoological work, to describe each genus or species in the exact order of their affinities, but that leaps must often be made from one part of the system to another, just as in a geographical work we cannot describe the counties of Great Britain in their exact order of position, but must continually make lateral digressions, and then return to the main line of our route. So in anatomy, we not only cannot study or describe the several parts in the order in which they join each other in the human body, but each part must even be dissected out from the rest, and removed from its natural position, before we can comprehend its characters and functions. This is an inconvenience inseparable from the nature of the case, and it is therefore no just complaint to make against a systematic work, that it frequently makes diversions which break the order of affinities. We are therefore at liberty to consult our own convenience, and consequently, whatever may be the form which the natural system, on further survey, may assume, there will be no reason for departing widely from the usual custom of commencing with Mammalia, and proceeding through Birds, Reptiles, and Fish, to the Mollusca, Annulosa, Radiata, &c. Let it not then be objected to the

* See Plate VIII., which exhibits one of these attempts at zoological map-making.

In order to show that the views here maintained are not chimerical, I will here present one or two *sketch*-maps of different families of birds, though I am well aware that our knowledge of natural history is as yet far too imperfect to pretend to accuracy*. Such sketches as these can be compared only to the rude efforts at map-making made by the ancients, of which the Peutinger Table is an example; and it is probably reserved for a distant age to introduce that degree of exactness into natural history which in modern geography is attained by a trigonometrical survey. For the sake of simplicity, in making these sketches I have omitted the consideration of *species*, but assuming that the genera of modern authors consist solely of closely allied species, I have proceeded to group them in what appeared to be their true position in respect of their affinities. In order to place these groups at their true distances, it is necessary to form a *scale of degrees of affinity*, to which the intervals between each genus shall correspond. I am aware that this scale must be, in some measure, arbitrary; but for this there is no remedy. The division of the fixed stars into *seven* magnitudes is arbitrary also, yet it is found in practice to answer the purpose. It is evident, from the complex ramifications assumed by the natural system, that it is impossible, in a zoological work, to describe each genus or species in the exact order of their affinities, but that leaps must often be made from one part of the system to another, just as in a geographical work we cannot describe the counties of Great Britain in their exact order of position, but must continually make lateral digressions, and then return to the main line of our route. So in anatomy, we not only cannot study or describe the several parts in the order in which they join each other in the human body, but each part must even be dissected out from the rest, and removed from its natural position, before we can comprehend its characters and functions. This is an inconvenience inseparable from the nature of the case, and it is therefore no just complaint to make against a systematic work, that it frequently makes diversions which break the order of affinities. We are therefore at liberty to consult our own convenience, and consequently, whatever may be the form which the natural system, on further survey, may assume, there will be no reason for departing widely from the usual custom of commencing with Mammalia, and proceeding through Birds, Reptiles, and Fish, to the Mollusca, Annulosa, Radiata, &c. Let it not then be objected to the

* See Plate VIII., which exhibits one of these attempts at zoological map-making.

method here proposed, that it is subversive of the arrangements now in use. No *linear* arrangement, whether adopted in a museum, a catalogue, or a descriptive work, ever *can* express the true succession of affinities: such an arrangement, therefore, is necessarily in great measure artificial, and, if sanctioned by custom, may still be adhered to. The true order of affinities can only be exhibited (if at all) by a pictorial representation on a *surface*, and the time may come when our works on natural history may all be illustrated by a series of *maps* on the plan of those rude sketches which are here exhibited.

Those symmetrical systems which are here combated are the natural result of that instinctive love of order which is innate in man, and which produces all the noblest works of art. It would doubtless have been more *convenient* for the arrangement of our museums, and more agreeable to our love of order, if the groups of organized beings *had* resolved themselves into a symmetrical plan; but if such is not the case, we must not sacrifice truth to convenience. My object in communicating these remarks will be gained if they induce naturalists to study Nature simply as she exists,—to follow her through the wild luxuriance of her ramifications, instead of pruning and distorting the tree of organic affinities into the formal symmetry of a clipped yew-tree.

It is needless to observe, that although the above remarks have been applied chiefly to the animal kingdom, yet that the principles here announced, if true at all, may be applied with equal correctness to botanical as to zoological systems.

## Appendix.

In Mr. Swainson's 'Classification of Birds,' the Procrustean process is effected in *five* different ways. 1. By transferring the members of redundant groups to fill the blanks in those which are deficient. Examples: *Haliaëtus* is transferred from Aquilinæ, and made a subgenus of *Astur*; *Myophonus* is transferred from Merulinæ to Myotherinæ; *Cinclosoma* from Turdidæ, and made a subgenus of *Grallina*; *Irena* from Dicrurinæ, and made a subgenus of *Oriolus*; Querulinæ from Ampelidæ to Muscicapidæ; Coracinæ from Ampelidæ to Corvidæ; *Carduelis* and *Linaria* are transferred from Fringillinæ to Coccothraustinæ; *Scythrops* from Cuculidæ to Rhamphastidæ; *Tichodroma* from Sittinæ to Troglodytinæ; *Orthonyx* from Crateropodinæ (where it comes next *Psophodes*) to Buphaginæ; *Hæmatopus* from Charadriadæ to Ardeadæ; *Eurypyga* from Ardeadæ to Scolopacidæ; *Phaëton* from Pelecanidæ to Laridæ; and *Dromas* from Charadriadæ to Laridæ.

method here proposed, that it is subversive of the arrangements now in use. No *linear* arrangement, whether adopted in a museum, a catalogue, or a descriptive work, ever *can* express the true succession of affinities: such an arrangement, therefore, is necessarily in great measure artificial, and, if sanctioned by custom, may still be adhered to. The true order of affinities can only be exhibited (if at all) by a pictorial representation on a *surface*, and the time may come when our works on natural history may all be illustrated by a series of *maps* on the plan of those rude sketches which are here exhibited.

Those symmetrical systems which are here combated are the natural result of that instinctive love of order which is innate in man, and which produces all the noblest works of art. It would doubtless have been more *convenient* for the arrangement of our museums, and more agreeable to our love of order, if the groups of organized beings *had* resolved themselves into a symmetrical plan; but if such is not the case, we must not sacrifice truth to convenience. My object in communicating these remarks will be gained if they induce naturalists to study Nature simply as she exists,—to follow her through the wild luxuriance of her ramifications, instead of pruning and distorting the tree of organic affinities into the formal symmetry of a clipped yew-tree.

It is needless to observe, that although the above remarks have been applied chiefly to the animal kingdom, yet that the principles here announced, if true at all, may be applied with equal correctness to botanical as to zoological systems.

## Appendix.

In Mr. Swainson's 'Classification of Birds,' the Procrustean process is effected in *five* different ways. 1. By transferring the members of redundant groups to fill the blanks in those which are deficient. Examples: *Haliaëtus* is transferred from Aquilinæ, and made a subgenus of *Astur*; *Myophonus* is transferred from Merulinæ to Myotherinæ; *Cinclosoma* from Turdidæ, and made a subgenus of *Grallina*; *Irena* from Dicrurinæ, and made a subgenus of *Oriolus*; Querulinæ from Ampelidæ to Muscicapidæ; Coracinæ from Ampelidæ to Corvidæ; *Carduelis* and *Linaria* are transferred from Fringillinæ to Coccothraustinæ; *Scythrops* from Cuculidæ to Rhamphastidæ; *Tichodroma* from Sittinæ to Troglodytinæ; *Orthonyx* from Crateropodinæ (where it comes next *Psophodes*) to Buphaginæ; *Hæmatopus* from Charadriadæ to Ardeadæ; *Eurypyga* from Ardeadæ to Scolopacidæ; *Phaëton* from Pelecanidæ to Laridæ; and *Dromas* from Charadriadæ to Laridæ.

method here proposed, that it is subversive of the arrangements now in use. No *linear* arrangement, whether adopted in a museum, a catalogue, or a descriptive work, ever *can* express the true succession of affinities: such an arrangement, therefore, is necessarily in great measure artificial, and, if sanctioned by custom, may still be adhered to. The true order of affinities can only be exhibited (if at all) by a pictorial representation on a *surface*, and the time may come when our works on natural history may all be illustrated by a series of *maps* on the plan of those rude sketches which are here exhibited.

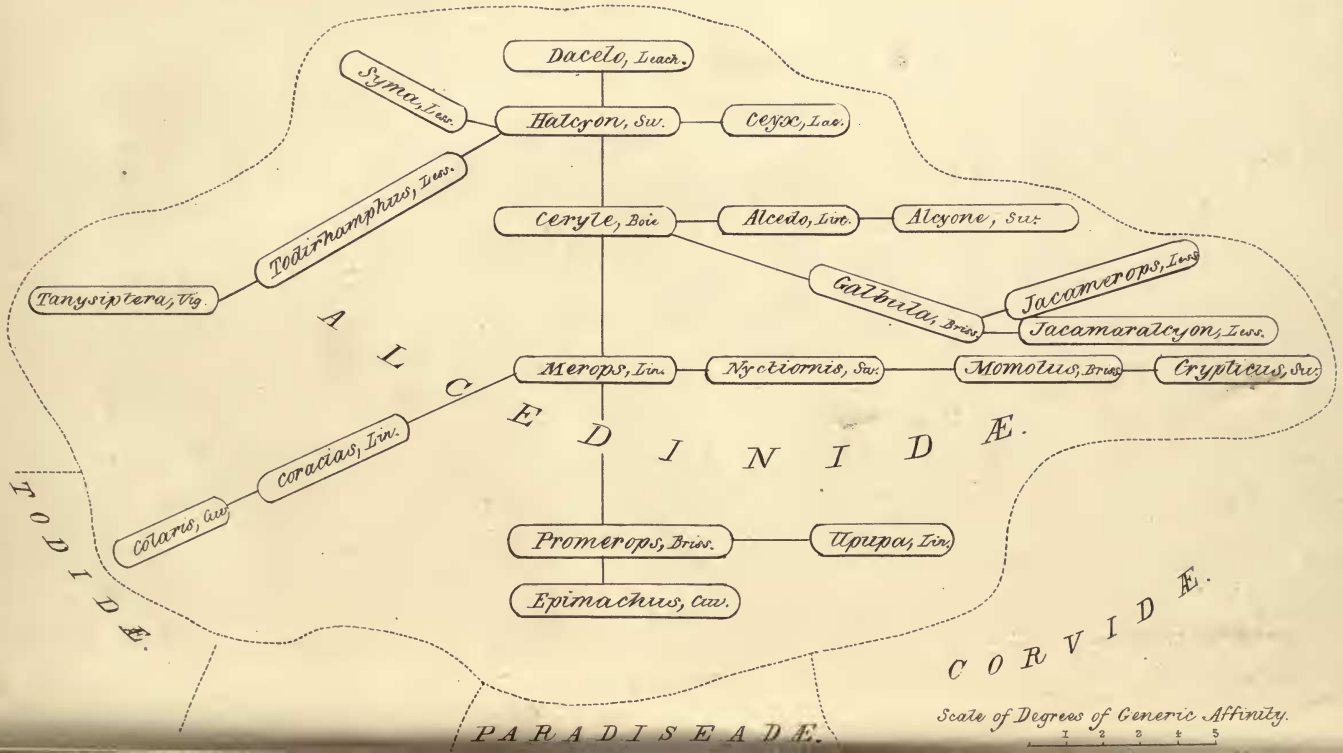
Those symmetrical systems which are here combated are the natural result of that instinctive love of order which is innate in man, and which produces all the noblest works of art. It would doubtless have been more *convenient* for the arrangement of our museums, and more agreeable to our love of order, if the groups of organized beings *had* resolved themselves into a symmetrical plan; but if such is not the case, we must not sacrifice truth to convenience. My object in communicating these remarks will be gained if they induce naturalists to study Nature simply as she exists,—to follow her through the wild luxuriance of her ramifications, instead of pruning and distorting the tree of organic affinities into the formal symmetry of a clipped yew-tree.

It is needless to observe, that although the above remarks have been applied chiefly to the animal kingdom, yet that the principles here announced, if true at all, may be applied with equal correctness to botanical as to zoological systems.

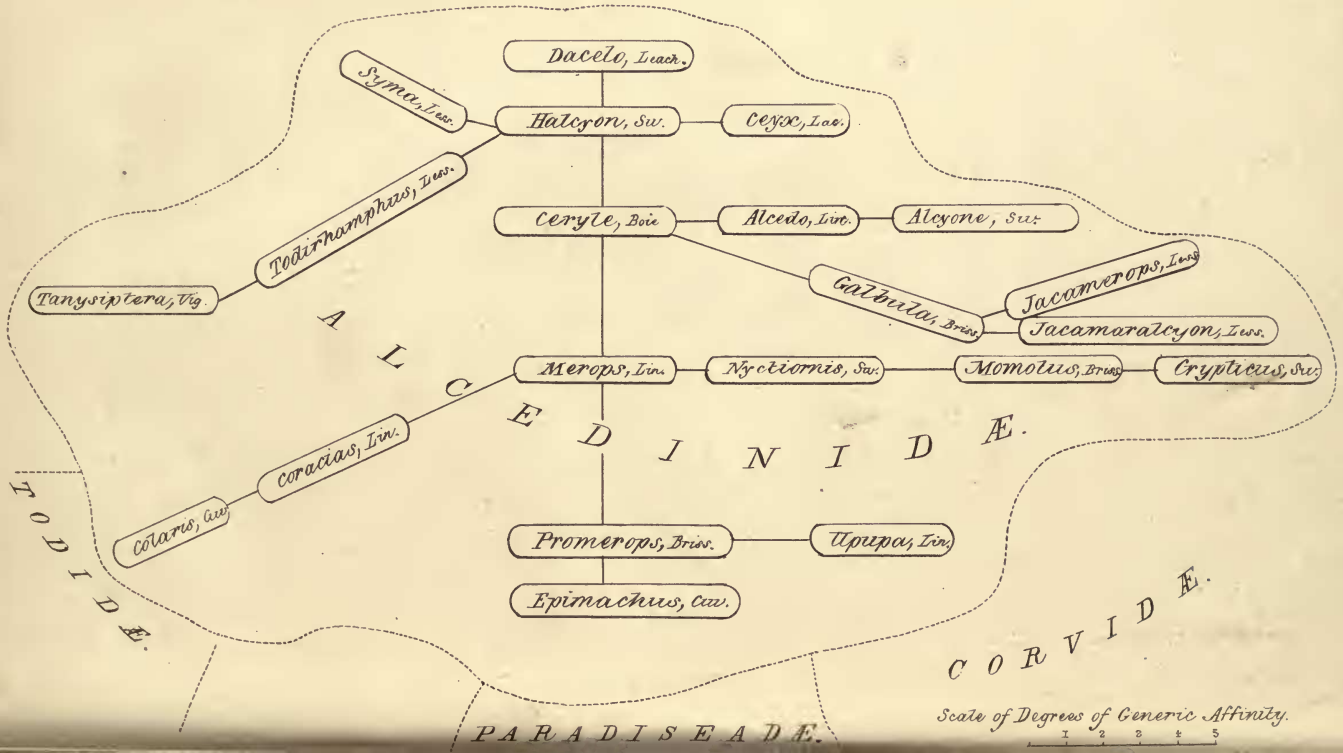
## Appendix.

In Mr. Swainson's 'Classification of Birds,' the Procrustean process is effected in *five* different ways. 1. By transferring the members of redundant groups to fill the blanks in those which are deficient. Examples: *Haliaëtus* is transferred from Aquilinæ, and made a subgenus of *Astur*; *Myophonus* is transferred from Merulinæ to Myotherinæ; *Cinclosoma* from Turdidæ, and made a subgenus of *Grallina*; *Irena* from Dicrurinæ, and made a subgenus of *Oriolus*; Querulinæ from Ampelidæ to Muscicapidæ; Coracinæ from Ampelidæ to Corvidæ; *Carduelis* and *Linaria* are transferred from Fringillinæ to Coccothraustinæ; *Scythrops* from Cuculidæ to Rhamphastidæ; *Tichodroma* from Sittinæ to Troglodytinæ; *Orthonyx* from Crateropodinæ (where it comes next *Psophodes*) to Buphaginæ; *Hæmatopus* from Charadriadæ to Ardeadæ; *Eurypyga* from Ardeadæ to Scolopacidæ; *Phaëton* from Pelecanidæ to Laridæ; and *Dromas* from Charadriadæ to Laridæ.

# Map of the Family Alcedinidæ.



# Map of the Family Alcedinidæ.



# Map of the Family Alcedinidæ.